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July 23, 2015

Ms. Michele Dermer
EPA Region 9, WTR-9
75 Hawthorne St.
San Francisco, CA 94105

Subject: Response to Comments on May 2015 Monthly Report and May 1-3, 2015 Fall-off Test, dated June 2, 2015
PG&E Test Injection/Withdrawal Well 1
Permit No. R9UIC-CA5-FY13-1
King Island, San Joaquin County, California

Dear Ms. Dermer:

PG&E has reviewed EPA's comments provided in their July 9, 2015 letter to PG&E regarding the May 2015 Monthly Report and the May 1-3, 2015 Fall-off Test, dated June 2, 2015. Our responses to EPA's comments are provided below.

Comments on the May 1-3, 2015 Fall-off Test, dated June 2, 2015

1. **EPA Comment:** The original static reservoir pressure in the Mokelumne River Formation reservoir was 2,050 pounds per square inch absolute (psia) at 4,671 feet true vertical depth (TVD), based on a pressure gradient of 0.439 psi/foot measured in the Moresco et al Unit A-1 discovery well. This FOT indicates a static pressure of 2,132 psia on May 3, 2015 after a cumulative injected air volume of 484 million standard cubic feet (MMscf), or 82 psi above the original static reservoir pressure, which is compatible with model predictions of pressure behavior at that point in the CAES test. *In accordance with the Monitoring Program in Appendix P of the permit, the reservoir pressure in the I/W Test Well 1 and the wellhead and calculated bottomhole pressure in the Piacentine 1-27 observation well should be monitored daily during the post-test monitoring period to ensure that it dissipates and remains at a level below the original static reservoir pressure of 2,050 psia as predicted in the simulations. PG&E may have proposed an alternative to this monitoring requirement, however no final proposal was received. Please confirm this requirement will be met.*

Response: PG&E performed an analysis of the Mokelumne River Formation original or initial reservoir pressure (P_i) based on the data in the King Island well files (see attached Excel file: Summary of King Island Initial Reservoir Pressure Data). The P_i for a subsea datum was calculated, rather than for ground level. P_i was calculated for the Moresco and Piacentine 1-27 wells (2,094.7 and 2,072.7 psia, respectively). PG&E used the average of these two P_i values, which is 2083.7 psia at -4,743 feet subsea.

EPA's comment referenced an initial pressure at a depth of 4671 feet TVD in the I/W well. This is the top of the gravel pack completion. If we use this depth for calculation (4671 feet TVD below KB = -4663' SS) at the I/W well location, the projected P_i is:

P_i = 2083.7 psia - (0.044 psi/ft x [4,743'-4,663'] = **2080.2 psia**

The depth correction is made using a 0.044 psi/ft gas gradient based on the bottomhole pressures (BHP) and tubing head pressures (THP) for the two wells (BHP minus THP divided by depth). By comparison, the gas gradient in the recent Citizen Green gradient survey was 0.045 psi/ft.

PG&E confirms that in accordance with the Monitoring Program in Appendix P of the UIC Permit application and the PG&E letter to EPA dated July 22, 2015 titled *Request for Revision to Post Test Monitoring Program Requirements PG&E Test Injection/Withdrawal Well 1*, the reservoir pressure in the I/W Test Well 1 will be measured monthly and the wellhead and calculated bottomhole pressures in the I/W Test well 1 and Piacentine 1-27 observation well will be monitored daily during the post-test monitoring period to ensure that it dissipates and remains at a level below the original static reservoir pressure of **2,080.2 psia.**

2. **EPA Comment:** In summary, the May 1st-3rd FOT analysis supports the permeability inputs and static reservoir pressure predictions in the reservoir model.

   Response: PG&E concurs with this statement.

Comments on the May 2015 Monthly Report for the PG&E Test Injection/Withdrawal Well 1

1. **EPA Comment:** The permit requires continuous monitoring and recording of tubing and annulus pressures and temperatures in the Piacentine 1-27 well and those data are presented in Attachment 2 of the May Monthly Report. However, the Evaluation of Pressure Monitoring Data from the Piacentine 1-27 Observation Well, presented in Attachment 4 and discussed on the second page of the PG&E transmittal letter in the March Monthly Report, was omitted in the April and May monthly reports. PG&E should provide the plot of reservoir pressure versus cumulative net injection volumes and the tables labeled as Attachment 4a and 4b in Attachment 4, or explain why the plot and tables were omitted. Also, a discussion of the comparison of the actual to the predicted bottomhole pressures should be added to page 2 of the transmittal letter, similar to the discussion in the March Monthly Report.

Response: The Evaluation of Pressure Monitoring Data from the Piacentine 1-27 Observation Well and the discussion comparing the actual to the predicted bottom hole pressures were included in the March 2015 Monthly Report in response to a specific request from the EPA. Since this information is not required by the Permit to be included in the monthly reporting, it was omitted from the April and May 2015 Monthly Reports. However, since Part II.E.5.g of the Permit requires quarterly reports to include "... updates comparing test results to the predictive models ...", an updated evaluation of the Piacentine 1-27 bottom hole pressures will be included in the Second Quarter 2015 - Quarterly Report. The quarterly report will include an updated chart with Piacentine 1-27 predicted and calculated bottomhole pressures plotted vs. cumulative net injection volumes and a discussion comparing the predicted and calculated pressures. The calculated bottomhole pressures will be determined based on the several pressure gradient surveys run in the Piacentine 1-27 during the reporting period.

2. **EPA Comment:** The footnotes to the daily monitoring data table and hourly monitoring data table in Attachment 2 indicate that a TDML log and temperature log were run in the Piacentine 1-27 well in April. Also, footnote 2 to Attachment 2a, the hourly monitoring data table, indicates that a BHP survey was run in this well. PG&E should provide copies of the logs and BHP survey report to EPA.

   Response: The TDML log, temperature log, and BHP survey report were sent to the EPA in a letter, dated July 8, 2015, entitled Response to Comments on April 2015 Monthly Report and Evaluation of Annular Pressure Temperature Relationship, dated June 8, 2015.

If you have any questions regarding these responses or require additional information, please feel free to contact me at (415) 973-6270.

Sincerely,

Mike Medeiros
Manager, Renewable Energy Development

Cc: Mr. James Walker, EPA Consultant
Mr. Michael Woods, Division of Oil, Gas and Geothermal Resources
Ms. Anne L. Olson, Central Valley Regional Water Quality Control Board

Enclosures: Data CD Including:
Attachment 1 - Summary of King Island Initial Reservoir Pressure Data